The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

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REGISTERED AS A NEWSPAPER

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Safety First

This page is a monthly feature devoted to announcements in the interests of safety in Works and Laboratories.

STOP THE ROT!

Sandbags are little use for barricades or for putting out fire bombs if, when exposed to the weather, they rot and split. This they are sure to do unless specially treated. A simple new process has now been developed, which will effectively rotproof sandbags at very little cost, and make them last at least eight times as long. The materials are copper sulphate and washing soda, obtainable from chemists and grocery stores.

See that your sandbags are rotproofed before they are filled

Instructions obtainable from

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IMPERIAL CHEMICAL INDUSTRIES LIMITED

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The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

BOUVERIE HOUSE, 154 FLEET STREET, LONDON, E.C.4

Telegrams: ALLANGAS FLEET LONDON — Telephone: CENTRAL 3212 (10 lines)
GLASGOW: 116, Hope Street (Central 3970) — BIRMINGHAM: Daimler House, Paradise Street (Midland 0784-5)
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Post-War Industrial Organisation

THE world-wide discussion that is taking place about the post-war world comprises a great deal of wishful thinking. Almost everyone who is called upon to speak on the subject envisages the world after the war as organised in such a way that the dearest ambitions of himself and his circle will be realised by a stroke of the pen. Because some 85 per cent. of the population is in receipt of wages or of salaries of approximately wage-earning magnitude, a great deal is heard about socialism, the levelling of the classes, free and uniform education for all, and so on. Most people are in favour of raising the lot of the less fortunate, but how that is to be done still escapes concrete proposals that are likely to be of practical value. The most we can say is that a compulsory raising of the school-leaving age with a higher form of education for all who can benefit by it, improved housing, and better social amenities generally, are among the possibilities that can be forecast with some assurance.

All these improvements, however, require employment for all who wish to work as a necessary antecedent to their success. Although it appears to do so in war time, money does not grow on trees nor in the rich man's bank; it cannot indefinitely be conjured out of men's pockets by a stroke of the Chancellor's pen. It is necessary for business to be sufficiently active to put the money there before it can be used. It is therefore a fundamental necessity in any discussion of the future remodelling of the world that business, national and international business, shall be put upon a sound basis so that it may prosper and provide the wherewithal to build the brave new world.

In their wishful thinking about the future organisation of society, the bureaucrats are not backward in voicing their aspirations. Certain politicians, including some in the highest places, have been heard to declare that "if orderly progress is to be maintained, it will be necessary to maintain after the war the controls by which the national economy has been mobilised for war." Bureaucracy is thus beginning to stake a claim in the control of industry. This claim must be carefully watched lest we fall into a slough of despond deeper than that in which we wallowed after the last war.

In time of war the people of this country put up with bureaucratic control which is characterised by some features of despotism. In peace the nation will not willingly submit to control of this character. So far as industry is concerned the remedy through the ballot box is far less effective than for those whom the author of "1066 and All That" collectively designated "the common man." Whether bureaucratic control should be maintained over industry must in the outcome depend upon economic argument. A writer in *The Times* has posed the argument in the form of this question: "Is the further identification of the State and industry compatible with that adaptability within the economic organism of which the absence during the years before the war was certainly one of the reasons for the persistence of gross under-employment of the national productive resources?" Before the war economic trends throughout the world produced everywhere an increased rigidity in the industrial structure. This caused difficulties in adapting industry to competition arising either through new producers or from new products. The chemist is among the most active producers of new products and thus exercises an important influence over the answer to this fundamental question. The rigidity extended to labour, which did not readily move from place to place and could not be readily moved from one occupation to another. Capital was frequently put into activities which were not easily justifiable on economic grounds. In short, our international economic organism before the war was becoming increasingly less responsive to changes at a time when the increasing tempo of scientific discovery and invention demanded exactly the reverse.

It has been suggested that if there is to be any sort of State regulation of industry it must be directed wholly towards the breaking down of the rigidity of employment, of capital, of costs of production, and of adaptation. This in turn encroaches markedly on the hitherto accepted rights of Trade Unions, of capital, and of employers. A case can also be made for maintaining that the State should reserve its control for international political questions such as were dealt with in our leading article. "Trade After the War" on May 30, and should not otherwise attempt to control the liberty of the individual. The truth is very difficult to discover in this well of complexities. It is certain, however, that when this war finishes a vast quantity of goods of all kinds, chemicals, engineering products, plant, articles of domestic consumption, and so forth, will be required. This will be due in part to the turn-over from war production to peace, from wear and tear due to intensive work without proper opportunity for replacement, and to the present discouragement of personal buying. One direction in which the nation will look for Government assistance is in exercising some sort of priority-control over these requirements so that first things can come first, and the post-war trade "boom" will not like a new star burst out into uncontrolled splendour for a few months and then sink into darkness and obscurity, but will attain a lesser peak initially, and retain its brightness until other post-war measures have had time to take effect.

On Other Pages

NOTES AND COMMENTS

Scientific Propaganda

NOWHERE is the tendency of the English people to belittle their own achievements more dangerous than in the world of science. For the most part, the population of this country has only a hazy realisation of scientific progress, and such knowledge as they have is derived very largely from the popular Press, which is not always strictly accurate in scientific matters. They are, therefore, easily susceptible to the effects of skilful propaganda, and in their characteristic good-natured way, are the first to help in passing on such propaganda. In the last century the Germans saw the advantage of a little geographic misrepresentation: they published cheap and excellent atlases containing the German versions of the names of Slavonic and Hungarian towns in S.E. Europe. To the English tongue, the German language comes easier to pronounce than the Slavonic: Laibach is simpler than Ljubljana; hence Laibach is thought of as a German town—very useful in these days of "national self-determination." German scientific propaganda, too, is unfortunately all too familiar, and there is always a good supply of half-informed Englishmen ready to praise German scientists at the expense of their own compatriots. A correspondent in this issue points out yet one more way in which the British public (and Press) is giving German science a helping hand by making the I.G. tradename "Buna" synonymous with synthetic rubber. Chemists should do their utmost to see that the Germans do not get away with it this time; even if synthetic rubber is not yet a major British product, there is no need to foster the idea that it is a German monopoly.

New Optical Glass

IF the notion is still prevalent that optical glass of German origin is necessarily the best procurable, it is high time that it was dispelled. Jena glass has certainly received world-wide publicity, and no doubt deserved its unique reputation in days gone by; but its pre-eminence is a thing of the past. There are two main reasons for this: the continuous improvement in British workmanship, and the discovery of adequate deposits of the high-grade sand essential to the manufacture of first-class optical glass, first in Scotland and later in Ireland. The chemist, too, has had a hand in the change, and has evolved new types of glass, making use of unusual oxides in combination with the silica that is the foundation of practically all glasses. Two recent patents taken out by the Eastman Kodak Co. describe optical glasses of great interest by reason of their composition and optical properties; in one series, for example, the dispersion figure varies between 45 and 50 and the refractive index lies in the region 1.7-1.75. A remarkable feature common to both series is the low proportion of silica, which in some cases is reduced to below 10 per cent., while the chief constituents are the oxides of rare earths. All the glasses described are said to be clear, hard, and able to withstand weathering.

Ventilation in the Black-out

HURRIED but essential measures taken at the outbreak of war, to comply with black-out regulations, often resulted in serious interference with existing means of ventilation, and a consequent evil effect on the health of the workers in factories, workshops, etc. Since then much progress has been made, but the matter remains one of great importance, particularly during the summer months. The Colt ventilator, described in THE CHEMICAL AGE, July 6, 1940, p. 6, has proved to be a most satisfactory method of ventilation during black-out hours; another method which has great advantages is the introduction of some mechanical installation, such as the suitable placing of extraction fans, which should be so arranged as to circulate large volumes of air at a temperature not much above that of the factory. In this way stimulating currents can be set up without giving rise to unpleasant draughts (*see* THE CHEMICAL AGE, May 3, 1941, p. 252). The problem of ventilation during black-out hours is a specially difficult one in works where chemicals are manufactured or used, because here, in addition to the usual safety considerations, there is always the danger of breathing or coming into physical contact with chemical substances. Both the methods referred to above can be, and indeed have been, effectively employed in chemical works.

More Information for Factories

FURTHER methods are described in a new pamphlet issued by the Ministry of Labour and National Service, entitled "Factory Ventilation in the Black-out" (Form 301; price 3d., post free). It is pointed out in this pamphlet that, in the widest sense, factory ventilation, if it is to be fully effective, must achieve not only the rapid removal of impurities in the air, but that this must be done at a rate of air movement which will have a sufficiently stimulating effect on the workers, and experience has shown that in the average work-room or factory the air should be changed about six times a day. Unit heater systems have been adopted in many factories, and during the summer months when heating is not required the heater fans can provide sufficient air movement. In some cases further cooling is obtained by circulating brine solution through the heaters. In considering the exhaust ventilation arrangements provided in many works for removing dust, fumes, or steam, it must be remembered that these are among the most important reasons for restoring ventilation of all kinds to the standard requisite before the outbreak of war. More extended details on attaining this end, while still preserving an effective black-out, will be found also in Welfare Pamphlet No. 5, "Ventilation of Factories" (price 1s. 8d., post free).

Synthetic Rubber and the State

CRITICISM of the Government's *non possumus* attitude towards home production of synthetic rubber is growing. In a letter to the Editor of the *Manchester Guardian*, Mr. Bob Edwards, an area officer of the Chemical Workers' Union, supports the newspaper's policy of challenging this attitude. He claims that the manufacture of (*e.g.*) butyl rubber does not require heavy capital expenditure on machinery and plant, and states that it can be produced in large quantities and at low cost direct from the products of the gas and coke industry. An estimated cost for this product is stated by an expert to be from 3d. to 4d. per lb. Mr. Edwards's solution of the problem of synthetic rubber production in this country is a Government plan for State-owned development with the immediate financing of large-scale research and the taking over of all patents and secret processes.

Official Research, not Official Control

WHILE we are in complete agreement with Mr. Edwards's plan of large-scale research financed by the Government, and are also in sympathy with his further contention that we should not be content to rely on American production of synthetic rubber, we confess to a horrible suspicion of the "State-owned development" part of his argument. Theoretically, of course, it is difficult to decry the advantages of official development of national resources; the State should be in a position to supply what is always a desirable commodity and what may become a direly urgent necessity should our American lifeline become severed. In practice, however, as has often been shown, State control means bureaucratic control, with all the strangling accompaniment of red tape. Eminent research workers, fortunately, are able to work in a rarefied atmosphere where bureaucracy suffocates; but when it comes to making and distributing the products resulting from their researches, then State control, if allowed, can exercise its stultifying powers to the full. It strikes us as curious that the most vehement opponents of "vested interests" are so ready to place themselves in the power of the greatest vested interest of all—a class of officials bound by no necessity to make their own economic living, but existing merely to see that rules are kept. Let there be State research, by all means; but let the results be exploited by those best trained to deal with it.

COLLECTED NOTES ON CHEMICAL SAFETY

Compressed-Air Plant and Air Liquefaction

by JOHN CREEVEY

AIR-COMPRESSING plant is involved in rather more accidents than might appear likely. Explosions due to pressure alone occur mainly with failure of the air receiver, but other parts of the plant, such as cooling pipes or cylinder cover, may be involved. Structural weakness of the parts concerned is the immediate cause, and such weakness might almost infallibly have been detected if the equipment had been thoroughly inspected in the course of maintenance routine. Some weakening may come from internal corrosion set up by moisture in the compressed air. As a safety precaution it is very desirable that the receiver should be one purposely made for the plant, properly proportioned and of adequate strength for the duty which falls to it. It is commonly thought that almost any vessel will serve this purpose, provided it is tight enough for pressure to be taken. Old boilers are frequently used, a boiler being a pressure vessel and therefore assumed to serve the purpose particularly well, although no precautions are taken to ascertain whether there is strength enough to withstand the prospective air pressure with a proper margin of safety. This use of old boilers has long ago received the comments of the Chief Inspector of Factories (*Ann. Rep.*, 1923).

Danger from Unsuitable Lubricating Oil.

Discounting the failure of parts of the plant under accumulating pressure, explosions may originate in the ignition of combustible matter (notably lubricating oil) which has gained access to the compressing system at one point or other; this hazard is especially dangerous in the case of compressors working on oxygen, but it exists also in the case of ordinary compressed air.

The importance of using the correct lubricating oil must be impressed upon all who are likely to have air-compressing machinery in their care. Explosions due to use of an unsuitable oil have been frequent, and have occurred wherever compressors are in use, quite apart from chemical works; in some cases (*Ann. Rep. Insp. Factories*, 1921) it has been noted that the oil had a comparatively high freezing point. Irrespective of what may be said otherwise, the type and grade of oil should be those approved by the makers of the plant; moreover, the oil must be used strictly in accordance with instructions as regards quantity and method of application. Modern lubricants are made to suit particular purposes, and the presence of one of the components may be especially dangerous in use on compressing plant. The hazard of explosion in the receiver, due to lubricating oil, may be reduced, if not completely obviated, by the use of a scavenger valve (*J. Inst. Petr. Tech.*, 1925, *11*, 305).

Moving Liquids with Compressed Air.

There are distinct dangers in moving liquids by aid of compressed air (*Z. angew. Chem.*, 1927, *40*, 1451). The dangers may come from mechanical or physical causes, but are equally likely to be chemical, as with a detonating mixture of hydrocarbon vapour and air. The hazard is greatest with heavy hydrocarbons of high boiling-point; nevertheless, it exists also in the case of light hydrocarbons, where the danger of vaporisation is even higher. The actual explosion may originate from contact between the detonating mixture and superheated air, burning carbon particles, or oil from the compressor. Explosions which have taken place while tar, tar oil, and fluid pitch were being transferred from one vessel to another by means of compressed air, have received comment in *Zentr. Gewerbehyg. Umfallverhüt.*, *14*, 316 (*see also Chem. Zentr.*, 1927, *2*, 2467).

Unsuspected Sequence of Contributing Factors.

The explosion of the cooling coil of an oxygen compressor (*Ann. Rep. Insp. Factories*, 1923) was found to be due to 0.07 per cent. of soap in the lubricating water for the cylinder; one person was killed and one injured. This soap was made specially for its intended purpose and was free from fat on being tested, but in the compressor it appears that the alkali of the soap became replaced by copper derived from the bronze of which the valves were made. The resulting copper soap broke down chemically at the temperature in the compressor to give hydrocarbon vapour and a residue (mainly copper) which was deposited on the piston; the copper deposit, in turn, caused local heating by friction, and a temperature was ultimately reached which ignited the hydrocarbon vapour now present in the oxygen. From these details it will be seen that individual unsuspected factors can contribute to final explosion.

Air must be Drawn from Clean Sources.

The air supply for any compressor must be drawn from a dust-free source; as an additional precaution, lubricating oil or grease must be used as sparingly as possible, provided that lubrication is duly performed. Consider the case of the explosion of an air compressor cylinder at work in a building where potassium perchlorate was in process of being crystallised and subsequently crushed and sieved (*Ann. Rep. Insp. Factories*, 1920), one person being killed. This compressor was used for forcing air into the perchlorate solution in course of crystallising in open tanks. In consequence of the crushing and sieving operations the air in the building carried a percentage of perchlorate dust. Perchlorate dust, coming in contact with the grease used for lubricating the compressor and so gaining access to the interior of the machine, was the primary cause of the explosion, such a mixture having been detected on the face of the piston and inside the cylinder cover. Potassium perchlorate is a powerful oxidising agent, and when mixed with oil or grease the mixture will detonate if struck with a hammer, but no precautions seem to have been taken in the light of that knowledge.

Compressed Air Pipelines.

Hazards in gas compression have been discussed (*Chem. Met. Eng.*, 1923, *28*, 632). Hydrogen, oxygen, carbon dioxide, chlorine, and ammonia are considered, with precautions to be taken to avoid danger. Contrary to what is commonly believed, air and ammonia form an explosive mixture, the danger being with the ammonia from 16 to 27 per cent. The United States Bureau of Mines has investigated the known causes of explosions in compressed-air lines and a Report (No. 2218) was published in 1921. It was found that oil used for the compressor was probably the most prevalent cause of explosions in compressed-air lines as well as receivers.

Air Liquefaction Plant Dangers.

Dangers in the liquefaction of air are mainly due to the presence of foreign gases, such as ozone and acetylene. Although air may carry only one part of acetylene in a million, it is easy for a kilogram of acetylene to accumulate in the plant with an uninterrupted run of 28 days at the rate of 1000 cu. m. of air per hour; this will give 4 kg. of acetylene-air mixture, which is distinctly dangerous. The danger of acetylene drawn from the air exists notably in industrial areas, but other sources have been indicated, such as the solid soda lime and caustic soda commonly sent to liquid air works in disused calcium carbide drums (*Z. komp. flüssige Gase*, 1927, *26*, 25).

An explosion in a liquid oxygen plant which took place when there was certainly no external source of acetylene (*Proc. 4th Internat. Congr. Refrigeration*, 1924, *2*, 1007), was ultimately traced to the production of acetylene or some product with like properties by decomposition of the lubricating oil owing to defective cooling. Lubricating oil with a flash point at nearly 315° C. gave acetylene when heated to about 175° in air compressed to 30 atmospheres. With all air liquefaction plant special care is therefore needed to prevent the overheating of the cylinder of the compressor, for even if acetylene is not produced by thermal decomposition of the oil there is still risk of explosive reaction between the oil and the compressed air.

Chemical Industry in Sweden

War-Time Changes

DR. RAGNAR WINBLADH, director of the chemical department of the Swedish Industrial Commission, has given an interesting survey of the progress made in the country's chemical industries since the beginning of the war. The imports surplus of chemical raw materials (including imports for the rubber industry) normally amounted to 280 mill. kr., *i.e.*, somewhat more than 60 per cent. of the production, and when after the outbreak of war and the invasion of Norway by Germany import connections with overseas countries were disturbed, Sweden had to develop many new productions.

The output of sulphuric acid has increased and is now sufficient to meet all local requirements. The production of sodium sulphate has also been greatly raised as has been that of nitric and hydrochloric acid. Various electro-chemical products are being produced in larger tonnages, and the change-over in the cellulose industry from wood pulp for newsprint to cellulose for synthetic fibres has also necessitated changes in chemical production. The output of chlorine and organic chlorine derivatives has been enlarged. Among new products which Sweden used to import, but now obtains from local factories, are zinc salts, chromic acid, chromium compounds, potassium permanganate, and certain phosphates. The latter probably refers to the production of apatite in northern Sweden which has been undertaken because of the lack of imported rock phosphates.

It may be added that the producing capacity of the Swedish chemical industry has also been increased by measures primarily designed to raise the output of metals, especially copper and aluminium. Finally, the expansion of the charcoal and wood distillation industry for purposes of iron smelting and producer-gas supply has increased the amount of valuable by-products for chemical use. Shortage of coal has been felt severely in some sections of the Swedish chemical industry.

Shale-Oil Production

With the possibility of a fuel shortage in view, the Swedish Navy Department, after many years of research, has lately produced a domestic oil fuel from shale which considerably augments the Navy's current fuel supply. The plant involved, designed by the Swedish mining engineer Sven Bergh, has been found successful in more than one way. After the oil and a gas of high thermal value have been extracted, the residue coke, although containing 90 per cent. ash, is burnt and suffices to supply the works power requirements. In addition, several tons of steam an hour are obtained for the gasoline and sulphur works attached, which for economic running are dependent on cheap steam. A surplus of steam is also available for heating in winter.

The most important by-product at present obtained is high-grade sulphur, used mainly in the rayon mills. It is reported that methods for the recovery of other by-products will be shortly operated, thus making shale-oil production economic under competitive peace time conditions also. Another Government-built shale-oil works, situated in the province of Närke, started operations recently, and production here is estimated at about 30,000 tons of oil per annum. Interesting experiments are at present taking place in Sweden with an entirely new electrical method of extracting oil from shale, and promising results have already been obtained.

In normal times Sweden imports about 1,000,000 tons of oil a year. The limited imports now accessible are only a small fraction of this quantity, and although the domestic production of shale-oil helps to mitigate the difficulty, it can satisfy only a minor part of the national needs. Despite this, Sweden has managed to keep her transport running, largely owing to the adoption of producer-gas as motor fuel. By skilful combination of their country's natural resources and their own inventive genius, Sweden's chemists are dealing adequately with a difficult situation.

Recovery of Lubricating Oil

Economical Filtration System

CONSIDERABLE attention has been paid in our columns during the last six months to that important question, the recovery of used lubricating oil. In the original article on the subject two groups of reclamation methods were described, those which could be carried out by the user, and those which required central recovery plant. The subsequent correspondence dealt with the latter class, but the former and simpler types of recovery have their own very considerable importance. All the three simple methods outlined involved filtration, justly described as a well-established practice.

Oddly enough, in the circular letter sent out recently by the Petroleum Board to users of lubricating oil, filtration was not included in the ten points catalogued which were described as "necessities" for economy in the use of lubricating oil. In fact, these ten points covered little more than careful practice, although reference was made in one instance to specialised recovery plants.

Actually, however, users of lubricating oil have at hand a simple and economical method of effecting recovery, in the shape of the filters manufactured by Stream-Line Filters, Ltd., Hele-Shaw Works, Ingate Place, London, S.W.8. The principle of these filters was evolved by Dr. H. S. Hele-Shaw, F.R.S., and the filter itself consists essentially of one or more columns of specially prepared paper discs compressed together. The liquid to be filtered is forced by pressure, or drawn by vacuum, into the filter pack, when every particle of dirt, however small, is removed. The solid particles which form a cake round the outer surface of each filter column can be entirely and easily moved by a counter-current flow of compressed air, whereby the filter is restored to its original condition.

Stream-Line Filters are probably well known to our readers. Those who wish for further information should apply to the company for their brochure No. W101, which is fully descriptive and copiously illustrated, and details both the pressure-operated filter for small-scale work, and the vacuum-operated filter for larger installations. The latter type can be constructed with a capacity up to 1000,000 gallons per annum.

LETTERS TO THE EDITOR

References to Synthetic Rubbers

SIR,—Our technical people have directed my attention to the tendency in the Press for the word "Buna" to be used as a generic term to cover all synthetic rubbers. As you may recall, I have more than once pointed out the habit of mind which persuades English people unconsciously to do propaganda for Germany. "Buna" is a German word and a German product. "Buna" synthetic rubbers were originally made only in Germany by the German chemical combine I.G. Farbenindustrie. Rights in the process were later granted to the U.S.A., and it is true that the "Buna" type of rubbers are being made in the States. I am not quite clear whether the word "Buna" is still a registered trademark or whether the right to use the word has been conceded along with the process. The important point is that only a limited class of synthetic rubbers can be correctly described as of the "Buna" type—using the word to describe their chemical nature. Other synthetic rubbers—the neoprenes, for example—are certainly not "Buna" types.

My purpose in writing is merely to point out that it will be against the national interest in the long run to establish the goodwill of what may be a German trademark as a generic name for synthetic rubber. The same type of thing has happened in other fields and tends to build up the idea that all things scientific derive from Germany and that Great Britain and other countries are back numbers.—Yours faithfully,

SIDNEY ROGERSON.

Imperial Chemical Industries, Ltd.
June 16, 1942.

SPOT TESTS

Some Applications of a New Principle

from Our Analytical Correspondent

THE name of Dr. Fritz Feigl is indissolubly associated in the minds of chemists with the development of the technique of " spot tests." To construe this technique in its narrowest (but all too common) sense—the use of complex organic compounds as sensitive reagents for inorganic ions—is to obtain but a meagre measure of the genius of Feigl as a scientific worker. His true fame should rest, not on his more logical vision and development of a new field, but rather on his ability to turn to unexpected uses the orthodox results which he has amassed in his researches. While genius has often been quoted as " an infinite capacity for taking pains," the truly great scientist has always been distinguished by the power to see in a discovery possibilities that would pass unnoticed by his lesser, though quite competent, contemporaries. And the history of modern science is landmarked by examples of this trait, of which the classic story of Perkin's discovery of aniline dyes is but a prototype.

Such a flair has continually been a feature of Feigl's work. It is only necessary to instance in this connection the many uses proposed by him for the iodine-azide reaction, and his application of spot tests to a wide variety of technical problems. No publication by Feigl can be ignored by analytical chemists, and his most recent paper, coming from his new home in South America, shows unmistakeable evidence of his originality. (Feigl and da Silva, *Ind. Eng. Chem. Anal. Ed.*, 1942, *14*, 316). Primarily describing a method for the detection of basic properties in slightly soluble materials, the paper expands unexpectedly in a way well worthy of notice.

It is well known that addition of dimethyl glyoxime to a neutral nickel solution will not cause complete precipitation of the metal complex unless the *p*H is altered (*e.g.*, by the addition of ammonia) to allow the reaction to go to completion. The filtrate from an incompletely precipitated system of this nature is necessarily in a state of very delicately adjusted equilibrium. The slightest addition of OH' ions (or removal of H' ions) will cause further precipitate to form, and this, since it is highly coloured, will be readily visible. A relatively insoluble basic substance may be incapable of producing a hydroxyl ion concentration which will affect an ordinary acid-base indicator such as phenolphthalein. Feigl and da Silva have found, however, that its very weak basic reaction will be indicated readily by an equilibrium solution of the type described. The action may even be graded as strongly basic, weakly basic, or negative, and a large number of very slightly soluble substances have been tested for their reaction.

So much for the backbone of the paper, which, important as it may be, is overshadowed by the outlined applications. Since traces of basic substances will give a brightly coloured " spot," it is possible to prepare contact prints showing the distribution of basic materials in minerals, metals, cements, and many other industrial products. Alternatively, direct application of the reagent followed by microscopic examination will attain the same end. High-grade glass will give little or no basic reaction, where ordinary glass will be strongly basic.

Closely Similar Compounds Distinguished

In analytical chemistry the test allows of a distinction between the gelatinous trace precipitates of alumina and silica frequently formed on addition of ammonia. If the precipitate is collected and washed till all soluble basic material is removed (as shown by testing the filtrate) and the precipitate itself is then tested, it will react negatively if it is silica. Apparently, however, gelatinous alumina adsorbs hydrogen ions, since it gives a positive reaction. Other distinctions between compounds which are chemically very similar are envisaged. ($HgCl_2.2NH_3$ and $HgNH_2Cl$, chromates and dichromates are quoted). Bicarbonate may be detected in the presence of carbon dioxide, since the bicarbonate will remove hydrogen ions from the reagent, producing a red precipitate.

Numerous organic compounds which are insoluble in water show a positive reaction. Benzidine, the naphthylamines and toluidines, dimethylaniline, and certain alkaloids are among those mentioned. On the other hand, sulphanilic acid and the *m*- and *p*-nitranilines give a negative reaction, showing that their basic groups are weaker than their acidic groups. (In this connection it is of interest that the sodium salt of sulphanilic acid gives an immediate basic reaction).

Finally, the various grades of filter paper behave diversely when spotted with the reagent. The action of the fibres in adsorbing hydrogen ions, combined with capillary separation of the constituents of the reagent, will produce rings whose thickness and intensity will vary from paper to paper.

Undoubtedly, now that the way has been shown by Feigl and da Silva, many other useful applications of this test will be devised. But it is impossible not to admire the ingenuity which has extended so widely the scope of what might justifiably have been dismissed as " just another spot test." This is definitely a paper which can be recommended equally to the attention of analysts and of would-be geniuses!

MINERALS CONTROL IN AUSTRALIA

Regulations to govern the control by the Federal Government of the production and supply in Australia of minerals, metals, the ore of metals, mineral oils, natural gas, oil shale, and similar substances throughout the Commonwealth have been issued under the National Security Act. Control will be exercised by a controller of minerals production, who, subject to the regulations and direction of the Minister for Supply and Development, is empowered to take possession of land, and notwithstanding any restrictions imposed by any other law, to use it or authorise its use for any purpose associated with minerals production. For the same purpose he may grant financial help to any person or authority, purchase goods, compulsorily acquire property, machinery or plant, or requisition the use thereof, make contracts or agreements, employ personnel, and sell or otherwise dispose of property held.

SCANDINAVIAN PATENTS FOR GERMANY

A new company has been formed in Berlin, under the title Faser-Chemie G.m.b.H., for the " purchase and development of chemical and technological processes for the production of cellulose and paper." It is reported that Faser-Chemie will begin its activities by taking over the German rights of certain Scandinavian patents for use in the German cellulose industry, but later it may exploit German processes in other Continental countries. The intention is apparently to make the new company a clearing house for patents. In many countries now occupied by German troops plants have been built or equipped for the production of cellulose and synthetic fibres by processes developed in other states, and the German companies which are concerned in Faser-Chemie were usually interested in these either financially or at least as technical advisers. This part of their work is now apparently to be centralised in the new company.

Ammonia Synthesis

Efficiency of Iron Catalysts

IRON obtained by the reduction of ferric oxide is a usual catalyst for ammonia synthesis. S. Lachinov (*J. Phys. Chem. Russ., 14,* 1260) investigated the process of this reduction and conditions favouring the efficiency of the catalyst.

In the first set of experiments the reduction of pure Fe_2O_3 was compared with that of Fe_2O_3 containing 5 per cent. Al_2O_3 and 2 per cent. K_2O; the reducing gas was a mixture of 3 H_2 and 1 N_2. The rate of reduction was determined by measuring the amount of water produced in the reaction $Fe_2O_3 + 3\ H_2 = 2\ Fe + 3\ H_2O$. The reduction of pure ferric oxide at 375°-400° C. took about 30 hours. The reduction of "promoted" ferric oxide at these temperatures slowed down so much that the temperature had to be gradually raised to 500° C., and even then the reaction consumed 170 hours. When the reduction was sensibly complete the pure iron gave 2 per cent. yield of NH_3, and the "promoted" iron, under equal conditions, a yield of 10 per cent.

In the second set the $Fe_2O_3 - Al_2O_3 - K_2O$ mixture was reduced at the constant temperature of 500°, varying the speed of the hydrogen-nitrogen gas, the pressure of which was 100 atm. The reaction proceeded first slowly (induction period), then its rate rose to a maximum and decayed again. The duration of the second period was 1-2 hours whatever the speed, but both the induction and the third period were the shorter the higher the gas velocity rose. At the highest velocity used the reduction was completed within 14 hours. The activity of the catalyst obtained increased with the gas velocity. When this velocity was very high, both the total reduction time and the activity of the catalyst seemed to reach a constant level.

In the third set the pressure was varied. At 500° the rate of reduction was not much affected by pressure, but at lower temperatures (down to 375°) it rose strongly when the pressure rose from 1 to 300 atm.

When the oxide was being reduced at 500° C. it became an efficient catalyst before the reduction was complete, but when the reduction was carried out at 400° the oxide reduced to 98 per cent. had only 0.6 of the activity of the fully reduced catalyst. No final explanation is given for this difference. Another observation requiring an interpretation is that of the slow reduction of the last 2-5 per cent. of Fe_2O_3; sometimes this last fraction requires as much time to reduce as the previous 30 per cent. Perhaps the reason could have been found more easily if the particle size and the packing arrangement of Lachinov's specimens were known.

Treatment of Lubricating Oils

Determination of Sulphur and Phosphorus

THE increasing use of sulphurised fatty and mineral oils in lubricating oil, and of lubricating oil additives of the organically combined phosphorus type, emphasises the importance of determination methods of free sulphur and of phosphorus in such materials.

H. Levin and E. Stehr (*Ind. Eng. Chem., Anal. Ed.*, 1942, 2, 107) have developed a method for sulphur determination, based on Hardman and Barbehenn's method for determination of sulphur in rubber (*Anal. Ed.*, 1935, 7, 103). The sample, dissolved in benzene, is extracted with boiling acetone in the presence of copper, filtered, and the residue washed with benzene and acetone. Hydrogen sulphide is liberated by digestion with conc. hydrochloric acid, and is absorbed in ammoniacal cadmium chloride, where it is determined iodometrically after acidification. As little as 0.001 per cent. of free sulphur has been thus determined.

The phosphorus determination method, described by Levin, F. P. Farrell, and A. J. Millendorf (*Anal. Ed.*, 1942, 2, 122) involves ignition of the sample with sodium naphthenate, which serves to bind the phosphorus in inorganic water-soluble form. The water solution of the phosphate is reacted to form ammonium phosphomolybdate, which is centrifuged, and the phosphorus is calculated from the volume of precipitate. The method has been used for over three years, during which it has been applied satisfactorily to new and used lubricating oils containing phosphorus organically combined as phosphate, phosphite, and phosphatide.

Sealing Glass to Iron

New Method Eliminates Scarce Alloys

ONE of the claims upon the supply of nickel and cobalt may be almost eliminated by a new method of making tight seals between iron and glass, patented by Albert W. Hull and Louis Navias of the General Electric Research Laboratory, Schenectady, N.Y. Platinum was used in early electric lamps, since it has nearly the same rate of expansion as the glass then employed. Various substitutes for platinum were devised, satisfactory for lamp seals although not adapted to the large seals used for powerful vacuum tubes. Dr. Hull and others developed special nickel-iron-cobalt alloys for this latter application. The new invention claims to secure tight seals to glass without drawing on the limited supplies of nickel and cobalt. A series of glass compositions has been devised which can be used with iron and certain iron alloys. One consists of 45 per cent. silicon dioxide, 14 per cent. potassium oxide, 6 per cent. sodium oxide, 30 per cent. lead oxide, and 5 per cent. calcium fluoride. The rate of expansion is very close to that of iron. In seals using this series a further and separately patented invention of Dr. Navias also proves useful. When a glass containing lead is sealed to iron, some of the lead atoms migrate from the glass into the metal. This weakens the joint and may let air leak into the tube. Dr. Navias proposes placing a thin layer of lead-free glass in immediate contact with the metal, then sealing the lead-containing glass to that. The thin glass layer prevents the lead from reaching the iron, yet it is not thick enough to crack.

A New Source for Citral

East African Planting Experiments

THE cessation of supplies from Java lends special interest to a new potential source for citral and citronellal on a commercial scale, since presumably East Indian citronella oil is no longer obtainable. This new source is the Australian shrub, or small tree, *Leptospermum citratum* or lemon-scented tea tree, the oil from which was found as long ago as 1931 to contain 73.5 per cent. by weight of aldehydes, consisting principally of citral and citronellal, both of which are of extensive use in the perfumery industry.

Experimental plantations have been in existence for some time in Australia, but now commercial distillation of the oil has been undertaken for the first time, and not in Australia, but on the Kenya farm of Mr. Gilbert Walker, the well-known essential oil producer (*Bull. Imp. Inst.*, 1942, *40*, p. 1). The first attempt to distil the oil on a commercial scale was made in September, 1940, and further distillations, with better results, have been made in successive seasons since then. A yield of 158 lb. of oil to the acre has been obtained, and the oil content has varied between 1.44 and 1.68 per cent., calculated on the green basis. Much saving of labour and no falling off in oil content is obtained by sun-drying the leaves and twigs, thus reducing the weight of the charge by 50 per cent.

An examination of the oil in the Imperial Institute Laboratories showed a percentage of aldehydes (expressed as citral and citronellal) of 80.5, and British essential oil merchants have expressed the opinion that the oil would be useful in compounds for perfuming soap or lotions, provided that it could compete in price with the established citronella oil and lemongrass oil. The current price of these is respectively 16s. 6d. to 18s., and 19s. per lb., and shows a very great increase since the war. Mr. Walker is confident that a plantation of leptospermum trees with a high yield of oil can compete with them successfully.

Electrolytic Sodium Chlorate*

Preparation from Aqueous Sodium Chlorid

DESPITE the fact that alkali chlorates are of very great commercial importance, especially as a war material, no systematic and detailed data are available in the literature in regard to the various factors involved in their electrochemical preparation, a method that is increasingly superseding others. The present work was undertaken to study the efficiency of an experimental "chlorate cell" over a certain range of conditions. The cell consisted of a cylindrical glass vessel 6 in. in height and about 2 in. in diameter. It was closed with a well fitting cork which carried a platinum anode, a graphite cathode, a thermometer and an exit tube for the evolved gases. The temperature of the cell was controlled by immersion in a thermostat kept at the appropriate temperature; 100 c.c. of NaCl solution of known concentration represented the bath.

When a solution of an alkali chloride is electrolysed, hydrogen is liberated at the cathode and chlorine at the anode because of the high overvoltage necessary for the continuous discharge of OH′ ions. If the electrodes are near each other and the anodic and cathodic solutions allowed to mix freely, the chlorine forms hypochlorite by secondary reactions with the OH′ ions:

$$Cl_2 + OH' = HOCl + Cl' \quad \ldots \text{(i)}$$

$$HOCL + OH' = ClO' + H_2O \quad \ldots \text{(ii)}$$

The concentration of the hypochlorite is, however, kept below a certain equilibrium value because it is used up in a number of side-reactions, the chief among which are (a) reduction at the cathode, (b) discharge of the ClO′ ion at the anode and (c) chemical formation of the chlorate. The hypochlorite ion has a much lower discharge potential than the chloride ion and is therefore, preferentially discharged. In an alkaline solution all the hypochlorite is ionised; the whole of it, therefore, can be discharged. In acid solutions, however, proportion of the ClO′ ions is very low, as the hypochlorous acid is very weak and its ionsation is further suppressed by the free acid present. In an acid solution with a high concentration of the chloride, the discharge of ClO′ ions is expected to be very much smaller than that of the Cl′ ions. The discharged ClO′ ions, however, are converted into chlorate with the liberation of oxygen.

$$6ClO' + 3H_2O + 6F = 2ClO'_3 + 4Cl' + 6H' + 3O \quad \text{(iii)}$$

Slightly Acid Conditions Required

The chemical transformation of hypochlorite into chlorate can take place only in slightly acidified solutions because it is a reaction between the hypochlorite ion and the free hypochlorous acid.

$$ClO' + 2HClO = ClO'_3 + 2H' + 2Cl' \quad \ldots \text{(iv)}$$

If the hypochlorite is converted into the chlorate by the electrochemical reaction (iii), then it requires 6 farads more for 2 molecules of the chlorate. If the conversion is effected by the thermochemical reaction (iv), no electricity is used up and the formation of each molecule of the chlorate requires only 6 farads to produce 3 molecules of the hypochlorite. But the electrochemical conversion requires 9 farads per molecule and so there is a reative reduction in efficiency of 33.3 per cent. Usually, in any process of electrolytic oxidation, oxygen evolution at the anode causes a loss in efficiency. According to the earlier workers, if the main reaction occurring at the anode is the electrochemical formation of ClO'_3 ion by the oxidation of ClO′ ions according to equation (iii), there will be a loss in efficiency of 33.3 per cent., corresponding to a loss of one-third of the total active oxygen.

To get 100 per cent. efficiency, therefore, it is necessary to prevent reaction (iii) from occurring and to increase the speed of reaction (iv). A slight acidification and a high concentration of chloride should serve the purpose because the hypochlorous acid, being a weak acid, will not be ionised in amounts sufficient to permit the discharge of ClO′ ions to any appreciable extent and, by the law of mass action, speed of the reaction (iv) will be proportional to the square of the concentrations of free hypochlorous acid. There are other considerations which determine the acidity. A high acidity means a low solubility of chlorine and prevention of reactions (i) and (ii). So a good amount of the chlorine will escape. Moreover, free hypochlorous acid being volatile, much of it will be lost, especially at higher temperatures.

As regards the effect of variation of temperature on current efficiency, since acidic solutions have been used throughout, formation of the chlorate comes about chiefly by the thermochemical reaction (iv) and so the yield increases with temperature. But at higher temperatures the increase is not so great; so there must be some other factors which decrease the yield and the effects of which are much more pronounced at higher temperatures. The increased discharge of ClO′ and OH′ ions due to decrease in the oxygen overvoltage at high temperatures and the volatility of the free hypochlorous acid may act in this direction. Owing to the fall in overvoltage and the greater conductivity at higher temperatures the voltage is less.

Electrode Distance

No adequate information is available in the literature to show the effect of the variation of the interelectrode distance in chlorate cells. It has been taken for granted that the electrodes must be as near each other as possible. But the results show that there exists an optimum distance for maximum yield. Unless the solution is very vigorously stirred, a zone will be formed where the anodic and cathodic solutions meet and react to form the hypochlorite. From this zone the ClO′ ions would move towards the anode and get discharged if in the meanwhile they do not react chemically. So the farther away the neutral zone from the anode, the less will be the discharge of ClO′ ions and so the loss in efficiency will be comparatively small. But when the separation becomes great, the chlorine not finding a sufficiency of OH′ ions escapes and produces a loss. So there is a region of optimum efficiency where the combined loss due to these two causes is at a minimum. Results go to indicate that this optimum is attained when the electrodes are 5 cm. apart; and current efficiency is greater when they are vertical.

The effect of an increase in the initial concentration of sodium chloride is to increase the yield because a high concentration of Cl′ ions reduces the discharge of ClO′ ions. A very high yield results if the solution is kept saturated throughout the course of the electrolysis. Increase of the anodic current density also increases the yield, probably on account of the increased oxygen overvoltage and the consequent decrease in the amount of OH′ and ClO′ ions discharged.

For the prevention of cathodic reduction, it is necessary to add some foreign substance, and owing to the weakness of hypochlorous acid, very slight acidity is sufficient to suppress the formation of ClO′ ions. Potassium bichromate was early recognised to be effective in this respect and it has been hitherto the most useful addition agent. Though it acts catalytically, fairly large quantities are required. It is supposed to form an insoluble film of chromate which prevents the contact between the nascent hydrogen and the hypochlorite and chlorate. For example Mullü showed that no prevention of reduction takes place at a mercury cathode where no coherent film could be formed. Substances which are capable of forming an insoluble film round the cathode such as the alkaline and rare-earth elements, generally show a high yield. Manganese, iron and titanium are marked by the fact that their salts reduce the yield considerably. This is probably due to the fact that their salts get easily oxidised at the anode and subsequently reduced at the cathode and thus consume much of the current used.

* From a paper by S. S. Joshi and K. Srinivasan, Benares Hindu University, in *J. Ind. Chem. Soc.* 1941, 18, 12, 623.

Personal Notes

LORD GLENCONNER has joined the board of Imperial Chemical Industries, Ltd.

MR. D. M. BOYD and MR. H. G. ROPE have been appointed additional directors of Fison, Packard and Prentice, Ltd.

MR. HARRY HEY, chief metallurgist, Electrolytic Zinc Co. of Australasia, Ltd., has been elected a vice-president of the Australasian Institute of Mining and Metallurgy.

MR. B. J. HABGOOD, B.Sc., A.I.C., Chemist in the Research Department of I.C.I. (Dyestuffs), Ltd., has been elected a Fellow of the Institution of the Rubber Industry.

MR. S. W. GREIG, for many years London manager, has been elected to the board of British Paints, Ltd. He will continue to supervise the interests of the company in the London area.

MR. WILLIAM MORRISH SELVEY, who was first elected President of the Institute of Fuel in October, 1941, accepted the invitation of the Council, at a meeting of the Institute held on June 9, to continue in office for a further year. Mr. Selvey, who has been connected with the Institute since its inception, has for several years been Chairman of the Council.

LORD HYNDLEY has been appointed Controller-General of Coal in the new Ministry of Fuel and Power; he has hitherto been Controller-General of the Mines Department. SIR FRANK TRIBE, transferred from the Ministry of Labour, has been appointed Secretary to the new Ministry; the new Deputy Secretary is MR. W. G. NOTT-BOWER, from the Mines Department; and SIR WILLIAM BROWN has been seconded for duty in the Petroleum Branch.

MR. J. ATHERTON, of Thos. Firth and John Brown, Ltd., was last week elected chairman of the newly-formed Sheffield branch of the Industrial Catering Association. Other representatives of the chemical and allied industries on the committee, and on that of the Leeds branch which was formed at the same time, are: MR. F. GREAVES and MR. R. E. JOHNSON (Metropolitan Vickers Electric Co., Ltd., Sheffield), MISS L. M. CARNIE (George Cohen, Sons & Co., Ltd., Leeds), and MR. HOWELLS (Yorkshire Copper Works, Ltd., Leeds).

In addition to the Birthday Honours reported in our last week's issue, the O.B.E. (Civil Division) has been awarded to MR. E. G. BOWEN, Senior Scientific Officer, Ministry of Aircraft Production; and to MR. H. WOOLDRIDGE, Senior Scientific Officer, Department of Scientific and Industrial Research. MR. L. B. TURNER, Deputy Assistant Director, Explosives Department, Ministry of Supply, and MR. J. J. UNWIN, Scientific Officer, Ministry of Aircraft Production, have received the M.B.E. (Civil Division).

MR. EDWARD V. EVANS, O.B.E., F.I.C., was elected President of the Institution of Gas Engineers at the annual meeting last week, and MR. SIDNEY E. WHITEHEAD, J.P., B.Sc., was chosen as the new Vice-President. New Ordinary Members of Council were MESSRS. H. HARTLEY, R. D. KEILLOR, R. H. DUXBURY, and T. REYNOLDS. Four of the District Members of Council remain; new appointments were made for the following districts: Southern (MR. W. A. HOWIE), North British (MR. R. M. SIMPSON), Eastern Counties (MR. F. H. ROBINSON), and Manchester (MR. J. E. LISTER COOPER). DR. HAROLD G. COLMAN, F.I.C., was appointed to Honorary Membership.

Obituary

MR. THOMAS JOBSON, whose death last April at Morristown, New Jersey, has been reported, was a metallurgist who had specialised in the development of tool and alloy steel. A native of Newcastle-upon-Tyne, where he was born 86 years ago, he graduated in chemistry and metallurgy at the Royal College of Science. After an industrial apprenticeship at Sheffield, he went to America in 1912, to work with the U.S. Crucible Co., where he was chief metallurgist at the time of his retirement in 1933.

LIEUT. ARTHUR CAIRNS, of Dumfries, has been reported killed in action in Burma while serving with the Gurkha Rifles. Before the war Mr. Cairns was resident in India, where he held an important post with Messrs. Parke Davis and Co., Ltd., the manufacturing chemists. In February, he was reported missing in Malaya, but after six weeks of adventure in the jungle he was able to rejoin his regiment.

New Control Orders

Exports of Plastic Manufactures, Machines, Etc.

UNDER the Export of Goods (Control) (No. 26) Order, 1942 (S.R. & O. 1942, No. 1090, price 1d.) which comes into force on June 29, control is extended to cover certain gums, abrasive materials, and manufactures of plastic material (derived from cellulose, casein or synthetic resin). Licences will, in future, be required to export to all destinations:—preparations containing isinglass; gum copal and gum kauri; abrasive segments, consisting of grains of natural or manufactured abrasive bonded together with other material; paper, cloth and other flexible material coated with an abrasive grain, and articles made wholly or mainly from such coated material; and articles of various descriptions made wholly or mainly of plastic material derived from cellulose, casein or synthetic resin; certain decorative articles made of non-precious metals; and the following types of machinery (among others): air conditioning appliances incorporating fans or blowers; conveyors, cranes, and other elevating, hauling, loading, and winding machinery; machinery used for agitating, crushing, grinding, mixing, separating, screening, or washing mineral products; hardness-testing machines and parts thereof.

Applications for licences to export the articles made wholly or mainly of plastic material derived from cellulose, casein or synthetic resin and the articles made of non-precious metals, will not normally be entertained.

Fertilisers

The Minister of Supply, in consultation with the Minister of Agriculture, has made the Control of Fertilisers (No. 22) Order, 1942, which prohibits farmers from acquiring phosphatic or potassic fertilisers for delivery in England and Wales except: (a) for delivery before September 1, 1942, for application either to growing crops or to crops sown or planted before that date, or—in the case of basic slag—to crops sown or planted before January 1, 1943; or (b) under the authority of a permit issued by a County War Agricultural Executive Committee; or, (c) under the authority of a licence issued by the Minister of Supply.

The intention of the order is to secure an even distribution of available supplies of fertilisers among all farmers. Details of the distribution arrangements will be issued by the Ministry of Agriculture.

The system of obtaining supplies of fertilisers under the Provisions of the Control of Fertilisers (No. 12) Order, 1941, will be suspended in England and Wales, but will continue to have effect in Scotland, and the Control of Fertilisers (No. 20) Order, 1942, is revoked. Copies of the Order (S.R. & O. 1942, No. 1110) which came into force on June 15 can be obtained (price 1d.) from H.M. Stationery Office, or through any bookseller.

Aluminium Alloy Scrap

The Control of Aluminium (No. 5) Order, 1940, Direction No. 2 (S.R. & O. 1942, No. 1100), which came into force on June 11, fixes new maximum prices for aluminium alloy scrap and revokes Direction No. 1. The new maximum prices are as follows: (a) for aluminium alloy scrap in the form of turnings, millings, routings or any other form resulting from any machining operation, or in the form of grindings or fillings, £50 per ton delivered free at buyer's works, and £44 per ton delivered free at any other place; and (b) for other aluminium alloy scrap, £70 per ton delivered free at buyer's works, and £65 per ton delivered free elsewhere.

General News—From Week to Week

Organised savings in industry can be greatly expanded. This is the conviction of the National Savings Committee which sets out its reasons for this belief and gives detailed guidance for increasing the volume of savings in a booklet recently distributed to industrial concerns.

An anodic process for treating aluminium which results in maintaining the initial brightness of the surface, and actually improving the reflectivity thereof, was the subject of Mr. A. Ensor's recent paper on the "Brytal" process, read at the last meeting this session of the Electrodepositors' Technical Society. The new session will start in September.

While repairing a roof at the Pilkington-Sullivan Works, John Patrick Burns, aged 48, of Widnes, fell from a scaffold and was killed. A witness stated that he and Burns were repairing the roof with asbestos sheeting. Burns was working below the roof putting bolts through the sheeting when apparently he lost his balance. A verdict that death was due to misadventure was given. On behalf of I.C.I., Mr. W. S. Knowles expressed sympathy with the relatives.

Proposals for increasing Britain's food output, drawn up by Capt. Leonard Plugge's Parliamentary and Scientific Committee, include the suggestion that there should be more control over the raw materials of farming, such as the quality of fertilisers and seeds. The committee thinks there should be a directorate of scientific research in the Ministry of Agriculture for the special purpose of applying and developing the results of scientific discoveries.

The use of layers of corrugated paper as a substitute for rubber is being put into practice by a leading manufacturer of munitions as a result of his visit to the exhibition "Waste Paper Goes to War," which began its provincial tour in Manchester on Thursday. He saw that, because of its resiliency, corrugated paper could be used as a protector-pad or shock-absorber for various munitions, and hopes it will now be possible to manufacture one product, previously requiring rubber pads, entirely from paper.

Two gelatine-manufacturing firms were fined at West Bromwich last Monday for having given a false warranty in respect of edible gelatine supplied to a local firm. It was alleged that the gelatine supplied contained an excessive quantity of arsenic. When Mr. Dalton, defending, pointed out that they could sell the whole of their product for technical purposes, and that there was no suggestion of making an improper profit, the Stipendiary remarked that it would be better if they adopted that course and did not trouble about the public.

In view of the extreme danger to life resulting from drinking methanol, Sheriff Laing urged on June 10 at Aberdeen that this alcohol should receive a description other than "substitute for methylated spirits," and that all containers should be labelled "poison." He was conducting an inquiry into the death of two people who died after drinking methanol. In the evidence it was stated that, so far as was known, there was no ruling that methanol should be labelled "poison"; normally, it was labelled "for burning purposes only."

A surprising omission from the list of industry groups to be regarded as munitions industries in the Ministry of Labour's pamphlet "Deferment" is recorded by a correspondent of *The Times*. No mention is made, in the appendix to this pamphlet, of the refractory materials industry, the correspondent reveals. Any industrial chemist is aware of the indispensable importance of silica, magnesite, and other special refractory bricks, in the production of steel, coke, cement, and gas; without refractories essential war production would come to a halt.

The Council of the Royal Society of Arts is offering through the Thomas Gray Memorial Trust, a prize of £50 for an invention, publication or diagram considered to be an advancement in the science or practice of navigation. In 1941 the prize was won by Mr. T. R. Metcalfe, O.B.E., of Windsor, for his seaman's protective suit, provided by the Ministry of War Transport in boats and rafts. A new award of £50 is also offered by the Council for a deed of outstanding professional merit by a member of the British merchant navy in the year ending September 30, 1942.

Chemical and Natural Products, Ltd., of London, S.W.19, the distributing subsidiary of Scrubb and Co., Ltd., have been elected associates of the American Chamber of Commerce in London.

Wholesale prices in May for industrial materials and manufactures stood at 159.4, as measured by the Board of Trade index number (1930 = 100), making the small rise of only 0.1 per cent. over April, and of 2.9 per cent. over May, 1941. Iron and steel prices at 182.7, and non-ferrous metal prices at 125.4, were stationary, but chemicals and oils showed an increase of 0.1 per cent. to 134.5 (April 134.3). In this group aluminium sulphate rose by about 6 per cent. on May 19, and salicylic acid became dearer by about 9.5 per cent. towards the end of the month.

Foreign News

A method of minimising the effect of blast on window glass is reported to have been discovered by two members of the staff of the University of Capetown. Details are not available, but it is amilced that the new method, which is inexpensive, enables glass to withstand the blast of a 500 lb. medium-case bomb only 70 ft. away. Full information will be communicated to the British and allied Governments

Coal, coke made from coal, and coal or coke briquets imported from Canada, Mexico, and the United Kingdom into the United States, and entered for consumption or withdrawn from warehouse for consumption during the period ending December 31, 1942, will, by a decision of the U.S. Treasury, not be subject to the tax of 10 cents per 100 lb. provided in the Internal Revenue Code.

United States production of manganese ore containing 35 per cent. or more manganese during February, was 9500 tons; shipments were 9600 tons; and producers' stocks at the end of the month were 1300 tons, according to the U.S. Bureau of Mines. In January, production was 11,700 tons; shipments were 11,700 tons; and producers' stocks were 1400 tons. Shipments in 1941 totalled 76,000 tons.

Tannin solutions can now be preserved over longer periods by a simple treatment disclosed in a patent assigned to the Tannin Corporation of New York. In standing, tannin solutions tend to precipitate, thereby losing their effectiveness for the treatment of burns, but according to the new process a stabilising treatment can be applied to delay precipitation. A small amount of boric acid is added to the solution, raising the acidity of the tannin to a point higher than the acidity of a normal solution of tannin in water. The tannin content of the solution should be between 2 and 10 per cent.

The moisture content of lignite—some 25 to 40 per cent.—which makes it of relatively low commercial value as a fuel, has been utilised by research chemists at Minnesota University to obtain gases rich in hydrogen. The hydrogen so obtained may synthesised with nitrogen to form ammonia. In the new process the lignite is crushed and fed into a long vertical tube, a selected portion of which is heated to about 700°. As the lignite moves through the reaction tube and its temperature is raised, the vapours and steam so generated are forced to flow through the lignite as it moves down the tube. The steam passing through the lignite reacts with it to form hydrogen.

Forthcoming Events

The Birmingham and Midlands Section of the **Institute of Chemistry** will meet at the Chamber of Commerce, New Street, Birmingham, at 6 p.m., on **June 24,** when a lecture on "Adhesives" will be delivered by Dr. M. G. M. Pryor.

The annual general meeting of the **Society of Chemical Industry** will be held at the Royal Institution, Albemarle Street, London, W.1, by kind permission of the managers, on **July 10.** The council will meet in the forenoon and thereafter members and their friends will lunch at the Trocadero and Messrs. Stewarts—in two parties. At the termination of the meeting the President and Mrs. Cullen will entertain members and their friends to tea. Further particulars will be announced later.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

REED, MILLICAN AND CO., LTD., Newcastle-on-Tyne, glass, oil and paint merchants. (M., 20/6/42.) April 25, mortgage and two further charges (sec. 81, 1929 Act) to Northern Counties Permanent Building Society, securing £6617 17s. 9d., charged on Croft Glass Works, Market Street, Newcastle-on-Tyne. *Nil. August 27, 1940.

NATIONAL FIRE PROTECTION CO., LTD., Richmond, (Sy.). (M., 20/6/42.) May 28, debenture to Barclays Bank, Ltd., securing all moneys due or to become due to the bank; general charge. *£5000. October 8, 1941.

PLASTICS AND RUBBER MACHINERY CO., LTD., London, W. (M., 20/6/42.) May 15, £4000 debenture to J. Allcock, Fairfield, Manchester; general charge.

METAL SPRAYERS, LTD., London, N.W. (M., 20/6/42.) May 29, £1000 debentures; general charge (subject, etc.). *£2000. March 4, 1942.

Satisfaction

STEATITE AND PORCELAIN PRODUCTS, LTD., Slough. (M.S., 20/6/42.) Satisfaction May 19, of debenture registered May 3, 1933, to the extent of £900.

Company News

Turner and Newall, Ltd., have declared an interim dividend of 3¾ per cent. on the ordinary stock (same).

The Amalgamated Metal Corporation announces a dividend of 3½ per cent. (6 per cent.) on the ordinary shares for the year ended March 31, 1942.

Boots Pure Drug Co., Ltd., report a net profit of £622,784 (£629,110); the final ordinary dividend is 4 per cent., making a total of 24 per cent. (same) for the year ended March 31.

British Alkaloids, Ltd. (manufacturers of T.C.P.), whose dividend payments were announced in our last week's issue, now report a net profit of £58,526 (£51,767).

British Emulsifiers, Ltd., report that the Whitehead Industrial Trust, Mitre House, 177 Regent Street, W.1, has been appointed to act as registrars to the company.

Derbyshire Stone, Ltd., announce a combined profit for 1941 (for the company and its subsidiaries) of £69,971 (£68,025), after providing for E.P.T. but before provision for depreciation and income tax. The ordinary dividend is again 10 per cent., and the carry forward is £49,812 (£39,276).

Chemical and Allied Stocks and Shares

UNDER the influence of the latest turn in the war news, business in Stock Exchange markets has contracted and values in most sections have lost a good part of the rise shown earlier in the month. There was, however, very little selling, and the marking down of prices was largely a precautionary measure. At the time of writing the general undertone of markets has developed a firmer appearance, sentiment having been aided by the absence of any heavy selling, which indicates continued confidence in the future and willingness to take more than a short view.

Compared with a week ago, Imperial Chemical have moved back from 33s. 4½d. to 32s. 1½d. at the time of writing; the 7 per cent. preference were 34s. following the deduction of the half-yearly dividend from the price. On the basis of last year's dividend of 8 per cent., I.C.I. ordinary units now yield around 5 per cent., which is in excess of the yield on numerous other leading industrial securities. Lever and Unilever, whose payment last year was 5 per cent., lost part of their recent rise, and were 27s. compared with 27s. 9d. a week ago. Moreover, in accordance with the general tendency, Boots Drug had an easier appearance, and were 35s. 9d. B. Laporte held last week's rise to 66s. 3d., and business in Fison Packard took place at 38s. 9d. The units of the Distillers Co. moved back 1s. to 75s. 9d., although the market remains very hopeful that the results, expected later in the month, will show the maintenance of the dividend at 16¼ per cent. United Molasses were 28s. compared with 28s. 6d. a week ago. Lawes Chemical 10s. shares have changed hands at 8s. 6d.

Goodlass Wall 10s. ordinary remained under the influence of satisfaction with the financial results and further improved in price; dealings ranged around 11s. earlier in the week. General Refractories at 10s. 6d. held most of an earlier improvement, and elsewhere Imperial Smelting were 10s. 3d. Allied Ironfounders were steady at 26s. 6d. in response to current market dividend estimates, and Amalgamated Metal were around 14s. 6d. In other directions, Borax Consolidated had a steady appearance at 31s. 3d., but Barry and Staines at 32s. 3d. lost part of last week's improvement pending the dividend announcement. Turner and Newall reacted from 71s. 6d. to 70s. There was again a fair number of dealings among shares of companies with interests in plastics; British Industrial Plastics 2s. shares remained around 4s. 1½d. and Erinoid transferred at 8s. 1¾d. British Aluminium at 44s. were virtually unchanged on balance, but British Oxygen reacted from 67s. 6d. to 66s. 6d. In response to current dividend estimates, British Plaster Board remained firm. At 22s. 9d. they were slightly higher than a week ago.

Movements in iron, steel and allied issues were moderate in character. Stewarts and Lloyds were 47s. 1¾d. and Tube Investments 83s. 9d. There was a better tendency in Richard Thomas ordinary at 6s. 7¾d., but the preference shares moved back slightly to 24s. 9d. Forster's Glass shares remained firmly held on the maintenance of the distribution at 15 per cent., but elsewhere Triplex Glass eased to 32s. 1¾d. British Celanese ordinary were slightly lower at 9s. 3d.; the second preference at 21s. also reflected the reactionary trend of markets this week.

British Match at 33s. 6d. provided a steady feature, while in other directions, Dunlop Rubber were little changed at 28s. Monsanto Chemicals 5½ per cent. preference were again 22s. 6d., and pending the financial results, Morgan Crucible preference shares held their recent improvement. Wall Paper Manufacturers deferred units lost part of last week's good rise, and were 27s. 6d., compared with 28s. 9d. Pinchin Johnson moved back from 26s. 3d. to 24s. 6d. Anglo-Iranian were affected by the war news from Libya, and lower levels ruled for other leading oil shares.

British Chemical Prices

Market Reports

MARKET conditions generally are reported as steady with deliveries against existing contracts covering good volumes. Values throughout the market display a strong undertone, but no important price changes fall to be recorded. There is a steady demand for all grades of borax and for boric and acetic acids, and among the other acids oxalic, citric, and tartaric remain in short supply. A tightness in the supply position is the chief feature of the potash and soda products sections, whilst a steady inquiry is being put through for white powdered arsenic, formaldehyde, acetone, and the lead oxides. A firm tone is in evidence in the coal-tar products market, there being a brisk demand for creosote oil and for deliveries of crystal carbolic acid. Cresylic acid is almost unobtainable on spot, available quantities being absorbed under existing contracts. Pitch is enjoying a fair inquiry whilst the xylols continue a dull market.

MANCHESTER.—A feature of trading on the Manchester chemical market during the past week has been the steady demand, chiefly against contracts, for the leading alkalis, and also for the ammonia and magnesia products. Sulphuric and hydrochloric, among the heavy acids, are also active sections. So far as values are concerned, there is not the slightest indication of easiness in any direction, and pretty well all classes of materials are strong in undertone. Among the tar products the xylols and solvent naphtha are not too strong, but in most other directions prices are firm and steady deliveries are being called for.

GLASGOW.—Business in the Scottish heavy chemical trade during the past week has shown a slight improvement in the home section. Export business is still very limited. Prices remain firm.

Price Changes

Cadmium Sulphide.—6s. to 6s. 6d. per lb.
Chrometan.—Crystals, 5½d. per lb.
Chromic Acid.—1s. 5d. per lb., less 2½%, d/d U.K.
Chromium Oxide.—Green, 2s. per lb.

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Use it again.
Salvage the remainder.

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